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ABSTRACT

Foreign or second language (L2) acquisition literature frequently makes the claim that, by not facilitating interaction, distance learning fails to create the conditions necessary for achieving the goals of widely accepted L2 communicative curriculum. This assumption is not as yet supported by any empirical evidence from L2 acquisition research. The assumption generalizes with respect to a formal definition of distance learning, ignoring the fact that different forms of distance learning create different conditions for interaction. It also generalizes with respect to a definition for interaction. With recent developments in communications technologies, particularly in the combination of fiber-optic networking and computer communications, and their high-cost adoption within the field of education, there is a need to assess the validity of what is referred to in this report as the untested assumption of "impaired interaction" in technology-mediated, multi-site instruction. The present study is designed to prov de some evidence in support of this need through the analysis of discourse generated in high school Russian L2 classes. The observed classes involved two geographically remote sites linked on the fiber-optic network in the state of Iowa. Evidence from discourse is supported by student perceptions of motivation, learning, and involvement in interaction derived from a post-instruction questionnaire. Results of discourse analyses suggest that a range of acceptable discourse patterns are perfectly feasible in multisite instruction where complete audio and video signals are available, although such interaction may not always be most appropriate for L2 acquisition. Analyses of questionnaire data indicate that students perceive interaction across sites to be a motivating feature of multisite instruction, but somewhat limited by methodological and organizational problems. Students do not cite the technology as a major impediment to interaction and learning. Six figures and nine tables illustrate data. (Contains 56 references.) (Author)

Running Head: MULTISITE L2 INSTRUCTION

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Interaction in Technology-Mediated, Multisite, Foreign Language Instruction

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Paper presented at the 1995 Annual Meeting of the American Educational Research Association, San Francisco, CA

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Abstract

Foreign or second language (L2) acquisition literature frequently makes the claim that, by not facilitating interaction, distance learning fails to create the conditions necessary for achieving the goals of the widely accepted L2 communicative curriculum. This assumption is not as yet supported by any empirical evidence from L2 acquisition research. The assumption generalizes with respect to a formal definition of distance learning, ignoring the fact that different forms of distance learning create different conditions for interaction. It also generalizes with respect to a definition of interaction. With recent developments in communications technologies, particularly in the combination of fiber–optic networking and computer communications, and their high–cost adoption within the field of education, there is a need to assess the validity of what is referred to in this report as the untested assumption of 'impaired interaction' in technology–mediated, multi–site instruction. The present study is designed to provide some evidence in support of this need through the analysis of discourse generated in high school Russian L2 classes. The observed classes involved two geographically remote sites linked on the fiber–optic network in the state of Iowa. Evidence from discourse analyses is supported by student perceptions of motivation, learning, and involvement in interaction derived from a post–instruction questionnaire. Results of discourse analyses suggest that a range of acceptable discourse patterns are perfectly feasible in multisite instruction where complete audio and video signals are available, although such interaction may not always be most appropriate for L2 acquisition. Analyses of questionnaire data indicate that students perceive interaction across sites to be a motivating feature of multisite instruction but somewhat limited by methodological and organizational problems. Students do not cite the technology as a major impediment to interaction and learning.

Assessing Interaction in Fiber–Optic Networked, Multisite, Foreign Language Instruction

The Changing Face of the Classroom

Fiber–Optic Networking

Since the development of the micro–computer in the 1970s, schools have been slowly exposed to a range of technological innovations capable of bringing the outside world into the classroom, or, alternatively of linking the student to the outside world. Laserdisks, CD–ROM, digitized audio, video, and graphics, hypermedia, virtual reality, computerized conferencing, electronic mail, interactive video, and fiber–optic networking are just a few of the technologies that have been developed to handle the transfer of multimedia information.

While many schools still exhibit only the most basic of computer technologies, others are keeping pace with more substantial changes. For example, in the state of Iowa, over 100 public schools have recently been linked to universities, community colleges, government agencies, the Internet, and global satellite facilities, through a newly installed, state-wide, fiber-optic network (see Educational IRM Qtrly., 1994). The network facilitates access through world–wide communications facilities to varied resources, databases, and potential remote collaborators and experts.

More significantly the network purports to facilitate, through audio, video, and digital channels of communication, two-way, real-time, interactive instruction across geographically dispersed sites. The combination of audio, video, and digital technologies linked through fiber-optic networking suggests that a reasonably accurate simulation of the single-site classroom and its instructional conditions may be achieved in the multisite environment.

For foreign or second language (L2) pedagogy, this is a particularly crucial claim, and one that requires careful investigation. Contemporary L2 instruction is intimately linked to the notion of interaction (see, for example, Omaggio, 1993); it is at once the goal, the medium, and the content of L2 acquisition. Thus, the value of any multisite, real-time, interactive technology to the instructional process must be measured in terms of the extent to which it is successful in facilitating interaction in the extended classroom.

Multisite Technologies in L2 Instruction

Technology-mediated, multisite L2 instruction is not a new phenomenon. Satellite, microwave, radiowave, and cable broadcast, independently or in combination with other communications technologies have all been used in the past to reach the distant learner or to access supplementary, distant sources of information, and are documented in the L2 literature. These technologies (see Figure 1) have all helped to supply educational needs to under-served populations, or have been used to increase learners' dynamic exposure to native speakers of the L2 and their culture. They have,

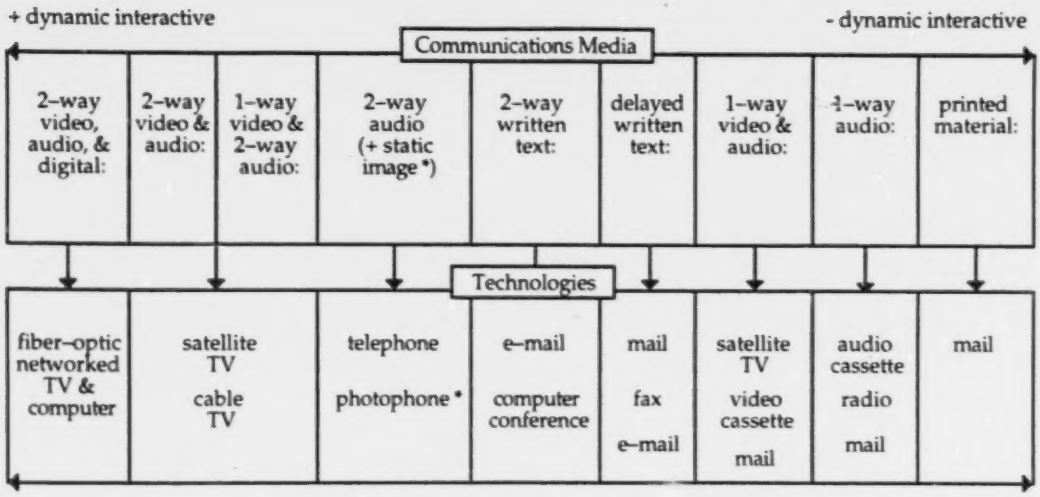

Figure 1. Distance education technologies and corresponding communications media on a +/- interactive cline

however, suffered from a number of problems which have guaranteed their limited pedagogical scope:

1. many systems do not provide complete two-way audio and video communication, thereby inhibiting immediate feedback and other interactive strategies; some systems provide no interactive facilities at all;
2. consequently, the circumstances for acquisition of the remote-site learners tend to be inferior to those of the origihation-site;
3. some systems are open to public reception on local television stations, which may undermine teachers' confidence;
4. some systems involve teachers in a television studio presentation of instruction, thereby inhibiting spontaneous interaction and learner initiated discourse;
5. some systems are engineer, rather than teacher, controlled, which imposes limitations on what the teacher is capable of doing minute by minute; and,
6. they involve narrow-band networking, limiting interactivity by kind, speed, and quality.

Fiber-optic networking, together with computer telecommunications and multimedia, inspires a new vision of multisite instruction which may be attributed to its greater speed and flexibility, higher quality, and greater range of data transmission potential (see Figure 1). Such characteristics may permit the types of interactive patterns between participants in L2 instruction that are possible in contemporary single-site classrooms. Thus, the problems that confined earlier forms of distance instruction to a limited portion of the educational market may now appear largely negligible with fiber-optic networking.

It is this kind of technology that is slowly giving the classroom a physical, social, and pedagogical panorama which is without precedence in the history of education. With fiber-optic networking and high-powered computer systems, the very definition of the term 'classroom', its space and its time, is beginning to be questioned by technologies which quite clearly are not a passing fad.

The Problem Defined

Such technological changes, with their inherent implications for curricular change, are not, however, free of serious dangers. The integration of a new technology into the pedagogical enterprise requires a thorough, unbiased examination of various factors all of which have the potential to alter the nature of learning outcomes. Adequately focused research is necessary because it ultimately provides us with the theories upon which we can base informed exploitation of such technologies.

This type of research has not been carried out with many of the technologies that have been used in multisite, L2 instruction. Nor have these technologies been discussed in the literature with any reference to cross-media constructs, measurable variables, or theoretically defined phenomena which would facilitate comparisons between the various projects described or with non-distant programs of L2 instruction.

Common Assumptions in L2 Distance Learning

For L2 acquisition in multisite environments, the lack of theory-based research on the use of new technologies has led to assumptions being made without an informed analysis of the issues. Typical of these assumptions are the following:

> Assumption 1: Multi-site instruction is a single instructional phenomenon, summarized under the label of distance education.

In reality each technology, or combination of technologies used in one educational setting, represents a unique environment, with its own distinct characteristics impinging upon the instructional process (see Figure 1). Two–way video, audio, and digital fiber-optic networking in multisite instruction may be considered to constitute such a unique environment.

> Assumption 2: The major justification for distance education is to provide instruction to those who would otherwise not receive it; or, more strictly, it is a means by which more students can be reached by a single teacher.

Warriner-Burke (1990) states that "the number of students varies from approximately 30...in a few instances to 'over 220 classes for German I and II in ten states'" (p. 129). These are misleading figures which conceal the technological and instructional circumstances that cater for such numbers. In effect, the literature cites a number of reasons why multisite technologies are used, in addition to facilitating educational opportunities to those who would otherwise not receive them. These reasons include: "Providing language students with the opportunity to interact with native speakers within a truly European setting" (Eddy, 1989, p. 211); "establishing direct communication between two groups of foreign language students in different parts of the world" (Gallego, 1992, p. 51); and "moving from

segmental/linear knowledge of language items to actual construction of meaning from the authentic content of language in use" (Perrin, 1992, p. 48).

> Assumption 3: In multisite models for L2 acquisition the human element of learning is significantly diminished.

The assumption here is that all multisite models for L2 acquisition are the same and produce the same effects on instruction. In reality there may be a threshold level along the technological continuum (see Figure 1) below which it becomes significantly more difficult to generate dynamic, human interaction.

> Assumption 4: All multisite models for L2 acquisition (i.e., distance education) inhibit interaction among students and instructors, including immediate feedback on performance.

As with assumption three, assumption four generalizes across technologies and ignores the fact that different technologies have different, and more or less successful, ways of handling interactive processes. Assumptions three and four represent the same problem - interpersonal communication in the extended classroom.

Clearly, these four untested assumptions reflect serious and perfectly valid concerns that the profession holds with regard to the integration of technologies into the instructional process. Warriner-Burke (1990) voices the preoccupation in the following way:

> We will never know whether or not distance learning is better than nothing - whether or not it is worthy of consideration by the profession - until it is seriously examined by objective and qualified educators taking into consideration the objectives that the profession espouses for a society in dire need of people who can function in other languages. (p. 132)

The Assumption of Impaired Interaction

One important avenue for investigation is suggested by the commonly held but untested assumption that interaction among students and instructors, including the provision of immediate feedback, is seriously impaired in multisite, technology-mediated L2 instruction (see assumption four, above). Warriner-Burke (1990) concludes that in distance learning: "Interaction between and among students is rendered extremely difficult" (p. 130). Arendt and Warriner-Burke (1990) are equally pessimistic: "Interaction between teachers and students is in practice minimal or non-existent" (p. 451). Davis (1988) states that:

> The problems most common to distance educators include encouraging student-teacher and student-student dialogue...(which is) exacerbated in many distance education programs because of the inflexibility of some pre-packaged materials, the normal time–lapse between initiation and response and the frequent isolation of the student from the learning group. (p. 548)

Davis (1988) further adds that: "To many engaged in the teaching of foreign languages, the sort of distance implied here, the absence of immediate teacher-student interaction, appears inimical to our enterprise" (p. 547).

The assumption of impaired interaction is questionable on a number of grounds. First, it reduces multisite, technology-mediated, L2 instruction to a single phenomenon in which all technological systems are viewed as effecting the same influences on the instructional process. Clearly different media facilitate different types of interaction, in the same way that different L2 teaching methodologies create the conditions for equally distinct interactive patterns. Ultimately, any classroom is an artificial and highly restricted social microcosm if it is to be used for the replication of an extensive range of social behaviors typical of the non–classroom L2 culture. As such, the single-site classroom is an equally questionable environment for the generation and sustaining of L2 interaction.

A second reason why the assumption of impaired interaction may be considered questionable is that it not only generalizes with regard to media but also with regard to an implied interpretation of the construct of interaction. The assumption suggests that interaction in multisite instruction is problematic, but what type of interaction is intended by this contention? Classroom-based L2 acquisition has the potential to create SOME of the conditions that prevail in the extremely varied range of extra-educational communicative events. SOME of these conditions, which may or may not coincide with those of the single-site classroom, may be replicable within the multisite, technology-mediated environment.

Third, the assumption ignores the important role that supplementary materials (e.g., video, static visuals, audio, or written texts) play in helping to create the conditions for L2 interaction to take place. In other words, technological media do not constitute the only influence on the degree to which interaction may be successful or not. Other factors, including supplementary materials used to provide a stimulus and contextualization for interaction, also bear upon the issue.

Finally, the validity of any assumption, unless it be axiomatic in nature, is predicated upon the existence of supporting evidence purveyed by research, which in the case of this assumption has up to now been lacking.

A Conceptual Definition of Interaction

Communication has become the foundation of the post-audio-visual era in L2 pedagogy. As a guiding principle in curriculum structure and materials development it has taken over from the grammar of written language in the grammar-translation era, and from the structural patterns of oral language in the audio-visual period. The practice of communication skills in the classroom is defended from various perspectives. Allwright (1984) considers that communication in the classroom is important because:

1. it facilitates the transfer of skills to the real world;
2. the process of communication is itself a learning process, and enhances both skills and knowledge of the language;
3. it implies involvement in learning and is therefore effective as an instructional strategy; and,

4. it promotes learning through peer interaction.

Clear definitions of the terms 'communication' and 'interaction', either of a conceptual or an operational nature, do not emerge from the literature. Allwright (1984) points out that of the four justifications which he cites for the integration of communicative activities in the L2 classroom (see above), only the last one uniquely involves live, person-to-person encounters, while the other three include interpretations of 'communication' where non-interactive work may be taking place. Thus, 'communication' suggests the expression of a message to a specific audience, which may be transmitted by oral or written modes, by live or recorded media, but does not entail exchange of reactions.

'Interaction', on the other hand, specifically concerns the dynamic and integrated, verbal or non-verbal actions and reactions of all participants in a communicative event. It is this two-way, dynamic participation in interpersonal communication - i.e., interaction - that forms the basis of an effective pedagogy for L2 instruction (Malamah-Thomas, 1987), and is the object of analysis in the present study. Interaction as a pedagogical strategy ensures that communication takes place (a difficult task when it is not part of the pedagogical process). Interaction also fosters the acquisition of communicative and linguistic skills, a major objective in the L2 curriculum. Allwright (1984) captures the value of interaction to L2 pedagogy in the following way: "The importance of interaction in classroom language learning is precisely that it entails this joint management of learning" (p. 156). Christie (1989), whose L1 work is based on a model of language as a tool to order experience and to construct information, sees the role of interaction in education in the following terms: "language is used partly to initiate, maintain and foster relationships, and partly for the negotiation of a 'content' of some kind" (p. 2).

Crucial to the interactive process are a number of important conditions and characteristics which need to be replicated in the multisite environment if the principles of a communicative L2 curriculum (Omaggio, 1993) are to be adhered to. These are outlined in the following sections.

Non-Verbal Contextualization

The coding and decoding of a message is facilitated by the existence of shared, extra-linguistic, contextual features in interaction. These contextual features may range from gestures and other non-verbal behaviors of any of the participants in interaction, to dynamic as well as stable situational characteristics. Such features help to provide links between the linguistic and supra-linguistic components of the message and the mental schemata used by participants in the process of interaction. In L2 interaction, where a speaker or listener's capacity to exploit the linguistic and supra-linguistic content of the message may be somewhat diminished, and in addition whose mental schemata in all likelihood correspond to the L1 culture, contextual clues are a crucial scaffolding device. Context, then, forms an important component in the interactive process by adding to its necessary redundancy load. The less experienced a participant is in L2 interaction the more important the role that context is likely to play in providing redundancy. Such contextual clues should be made available to all participants in a multisite environment for L2 learning.

Negotiated Interaction

A second crucial component of interaction concerns what Allwright (1984) describes as "mode of participation in interaction management" (p. 160). According to Allwright, mode of participation in interaction ranges along a directive–compliant continuum. Typically, interaction in the classroom involves the teacher in moves that are directing in nature. They allow the teacher to control the interaction and may be realized by questions, requests to carry out specific actions, or provision of information. The consequence of a directing mode is to determine the nature of the behavior of the interlocutor (i.e., the learner). At the other extreme of the continuum is the compliant mode of interactive behavior. In the classroom this is typically realized by the learner through responses, carrying out requested tasks, acknowledgment of receipt of information, or simply through silence.

More typical of interactive behavior in non-classroom environments is a mode of participation known as 'negotiation of meaning', which Brown and Yule (1983) describe thus:

> ...it is a feature of a lot of conversation that 'topics' are not fixed beforehand, but are negotiated in the process of conversing. Throughout a conversation, the next 'topic' of conversation is developing. Each speaker contributes to the conversation in terms of both the existing topic framework and his or her personal topic. (p. 89)

Allwright (1984) considers that negotiation takes place at the levels of turn, tone, task, code, and topic. Ellis (1980) also makes reference to negotiation of role. All of these levels of negotiation may be considered to contribute to meaning in interaction. While negotiation may be typical of the way non-classroom interaction is constructed or managed, it is certainly more difficult and far less common in classroom interaction. It is this feature of interaction which Malamah-Thomas (1987) implies in her definition of the term 'interaction' - "the constant pattern of mutual influence and adjustment", and which Scollon (1976) called "vertical collaborative construction of meaning". Allwright (1984) explains that: "It represents a level of initiative-taking that many learners would find unacceptably 'risky' and many teachers unacceptably challenging" (p. 161). Nevertheless, research in L2 acquisition indicates that negotiated meaning in the L2, especially through small-group or paired activities, positively affects L2 acquisition (see Long, 1983; Long & Sato, 1983; Ellis, 1984; Pica & Doughty, 1985; Doughty & Pica, 1986; Long, 1990; Schinke-Llano & Vicars, 1993; Gass & Varonis, 1994). Multisite environments for learning should be able to facilitate not only traditional teacher–centered discourse patterns but also patterns of interaction in which a more equitable share in negotiation of meaning takes place.

Availability of Input

A third condition for effective interaction in the classroom is the immediate availability of input, including feedback, to the learner. The term 'input' is typically understood as written or spoken linguistic stimuli provided to the learner (see Allwright & Bailey, 1991, p. 120, and Ellis, 1985, p. 298). As such it may be considered equivalent to the text component of the complete contextualized signal. It is in this restricted linguistic sense that the term 'input' is used in this study.

Input has been the focus of much research, and controversy, in L2 acquisition and pedagogical theory, and typically has been centered around the issue of what type of input and how much is made available to the learner. Krashen (1981, 1982) argues that the classroom learner must receive input which is roughly tuned to his or her level of L2 development ('comprehensible input'). He maintains that comprehensible input involves adaptations to language of a syntactic and lexical nature. Long (1980) considers that adaptations only need to be discoursal in nature for acquisition to take place.

Of more concern to the research study at hand is the source or origin of input, its degree of immediacy, and whether it is made available to all students involved in the learning process. Input in the multisite environment is not uniquely face-to-face; it is mostly technology-mediated, and may be derived from dynamic participation on the part of the teacher, other students at any of the participating sites, perhaps a remote-site facilitator, or from non-dynamic sources such as audio or video recordings, or written text. Whether this non-face-to-face and technology-mediated characteristic in interaction also accounts for any reduction in immediacy or impoverishment of input, either in terms of text or context, remains to be evaluated.

The Technology of Fiber–Optic, Multisite Instruction

In fiber-optic networked, multisite instruction, linguistic input, non-verbal contextualization, and mutual construction of meaning are mediated by a combination of audio-visual and digital technologies. A typical fiber-optic classroom (see Appendix, Figure 2) linking the origination–site to any number of remote–sites permits real time viewing of all participating sites - although not necessarily at the same time. This is achieved through the existence of sets of cameras in all sites. Typically three cameras are used, one at the front of the classroom, another at the rear, and a third overhead camera projection system at the teacher consul.

Video signals are displayed on TV monitors placed at strategic positions in the fiber–optic classrooms. A touch–sensitive computer monitor is typically used to control the source and quality of the video signal. All video displayed on remote and origination–site monitors is controlled by the teacher at the origination–site. unless such control is ceded to a remote–site which also has origination capabilities.

Audio linking between participating sites is achieved through microphones which relay audio signals synchronous with video signals along fiber-optic cabling. The teacher normally has an open, cabled, lapel microphone. Students typically use desk-located, closed microphones, which require the depressing of a button on the microphone base for communication to be made.

The network also supports additional hardware, including tape-recorders, video-players, laser-disks, and computers. These supporting technologies, especially the latter computer-based technologies, have hardly been given any consideration in practical, instructional applications at present, but certainly suggest a significant contribution to many classroom management and instructional activities, especially for the field of L2 instruction.

Background Research

Non-Content-Related Multisite or Distance Instruction

The non-content-related field of distance education has been characterized through much of the 1980s and 90s by a theoretical chasm which is highly pertinent to the status of interaction within the field. On the one hand there are those whose interpretation of distance learning derives from a traditional model based on correspondence education - the narrow definition of distance learning, and one which gave rise to the field in mid-19th century Europe (e.g., Keegan, 1980, 1986). This narrow interpretation gives scant recognition to the role of interaction in the learning process, while focusing predominantly on the content of learning and the role played by the individual.

Broader interpretations of distance learning have focused on the role that modern technologies can play in providing opportunities for real-time interaction across sites to enhance learning (e.g., Garrison & Shale, 1987). The broad interpretation of distance learning recognizes that interaction is a crucial component of the learning process, and therefore integrates new communication technologies to facilitate interaction between geographically dispersed participants in education.

Multisite L2 Instruction

Literature in the field of distance L2 instruction is sparse, anecdotal, and fragmented in its focus on a range of delivery media. There are reports of specific projects involving L2 instruction by correspondence (Karpiak, 1981); Spanish via photophone (Gallego, 1992); one-way video supplemented by local tutors for Japanese (Kataoka, 1986); one-way video instruction of German via television, supplemented by two-way audio by telephone (Johnson & Iten, 1984; Wohlert, 1989 - with electronic mail); a similar configuration for Latin and Japanese (Moore et al., 1991), and for Japanese (Oxford et al., 1992; Yi & Majima, 1993); one-way video, supplemented by fax, computer conferencing, and telephone for the teaching of English as a foreign language (Perrin, 1992); and fully interactive, two-way video and audio instruction of Spanish via cable television (George, 1989).

Prevalent in these anecdotal reports is the scant and unprincipled treatment of the construct of interaction. Typically it is defined neither in conceptual nor in operational terms. Nor is it described in relation to any prevailing theory of L2 acquisition or pedagogical methodology. Some recognize the inability of their technology to facilitate interaction across sites, and the consequent need for local non-technological services (e.g., Kataoka, 1986), or supplementary technologies (e.g., Yi & Majima, 1993; Moore et al., 1991; Wohlert, 1989). Interaction is generally understood, if at all, in substantially different ways to that normally understood within the field of L2 acquisition. That is, it does not recognize the role that input, mutual construction of meaning, and non-verbal contextual features (together with other characteristics) play in the interactive process.

Other reports of L2 distance education provide a more relevant account of the relationship between interaction, L2 acquisition, and the technologies used to mediate them. Gallego (1992), for example, in reference to two-way audio photophone instruction of Spanish, states that: "The Tele-class

has the potential to procure a communicative, task-based language learning setting while providing ample opportunity to learn and practice discourse management strategies" (p.52). Perrin (1992) provides another example of multisite technology critically applied to clear pedagogical objectives.

Overall, however, the impression is given in the L2 distance education literature of the use of multisite, technological media for the service of a traditional model of L2 acquisition in which interaction plays a minor role. It is, then, hardly surprising that such a panorama in the literature has led critics to conclude that "distance...appears inimical to our enterprise" (Davis, 1988, p. 547). Judgments of multisite, technology-mediated L2 instruction projects reported in the literature have tended to be made with disregard for the underlying model of L2 acquisition suggested by the described curricula. As has been pointed out, frequently such models of L2 acquisition are at odds with contemporary theory. Discussion of technological exploitation for pedagogical means must be made in light of the manner in which such exploitation takes place.

The Importance of Interaction for Language Acquisition

Few would disagree that interaction as a basis for a broad, pedagogical strategy has a positive influence on classroom-based, L2 learning. Research in child L1 acquisition during the 1970s suggested that the importance of interaction resided in the value of specific syntactic and phonological features of the input which were then reflected in the output of the learner (e.g., Snow, 1976; Sachs, 1977). More recently research has focused on the interactive behavior of mutually influencing interlocutors, indicating that certain types of care-giver engagement with children have a positive effect on the rate of L1 acquisition and on the acquisition of communicative strategies (see Cross, 1978; Ellis & Wells, 1980; Wells, 1981; Barnes et al., 1983).

If the analogy with L1 acquisition is a valid one, then L2 acquisition may also benefit from the integration of interaction into the learning process. L2 research mainly during the 1980s attempted to show that this was indeed the case. Hatch et al. (1979) suggested that interaction affected L2 acquisition by providing learners with an opportunity for 'vertical' construction of utterances, that is utterances made possible through the process of building discourse. Hatch et al. also claimed that interaction with different interlocutors was beneficial because it expanded the range of input made available to learners.

Long (1980, 1981, 1983) found empirical support for the positive effects of interactional modifications to input by native speakers. Such modifications, which Long considers are more consistent, extensive, and influential than syntactic and phonological modifications, have the effect of making input comprehensible to learners, thereby encouraging learner output and continued involvement in interaction. In classroom-based observation of ESL learners, Seliger (1977) concluded that high input generators (learners who were rated as frequent initiators of interaction) outperformed low input generators both with respect to levels of interaction and performance on final examinations. Others have given support in L2 acquisition research to the positive effects of active involvement in

interaction (e.g., Allwright, 1980; Ellis, 1980; Swain, 1985; Pica et al., 1987; Gass & Varonis, 1989 and 1994; and Loschky, 1994), while Schumann and Schumann (1977) have suggested that passive involvement in interaction ('eavesdropping') may also function as a learning strategy (the counter argument to Seliger's hypothesis).

A Model for Classroom Interaction

We have seen how Allwright (1984) captures the distinction between classroom and non-classroom discourse in a theoretical account that posits mode of participation in interaction as ranging along a continuum with compliant behavior at one extreme and directive behavior at the other. Negotiated interaction represents a socially necessary compromise between compliance and direction. Thus, typical behavior of the learner and the teacher in interaction may be represented by A in the model shown in Figure 3, while the objective of L2 classroom teaching may be represented by B.

In light of Allwright's theoretical account, effective L2 teaching, perhaps effective teaching in general, may be viewed as more predominantly composed of the features of negotiated interaction. The skill of the effective teacher lies, then, in engaging the learner in the learning process through interactive strategies, in what Malamah-Thomas (1987) describes as "a constant pattern of mutual influence and adjustment" (p. 7). It can be measured in terms of the extent to which socially valid communication can be integrated into the contrived environment of pedagogical discourse. To what extent it is possible to deal effectively with the tension between pedagogical discourse and attempts at

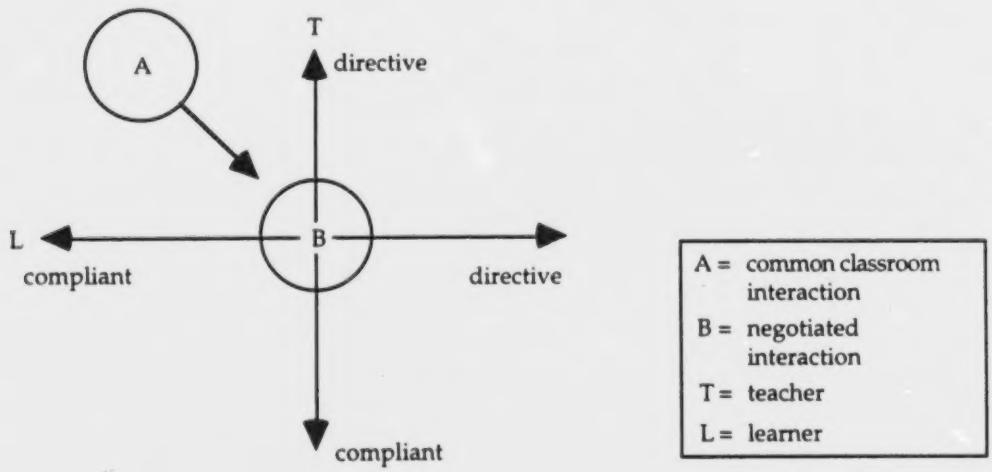

Figure 3. Model of classroom interaction.

naturalistic interaction in the multisite, technology-mediated environment of fiber-optic networked L2 instruction is the overarching question which guides the present research study.

Purpose of Study and Research Questions

The purpose of this study was to describe the discourse generated in multisite, fiber–optic networked high school Russian classes. The description was carried out using a theory–based framework for discourse analysis and permitted distinctions to be made between teacher–centered and student–centered discourse. Evidence of three important features of interaction - video–based contextual features, negotiation of meaning, and availability of input - were sought in the data. The research questions that guided this study were the following:

1. What are some of the contextual features of interaction in fiber–optic, multisite L2 instruction?
2. What evidence is available for teacher–dominated interaction?
3. What evidence is available for mutually constructed or negotiated meaning?

Results of analyses of the discourse data used to respond to questions two and three provide a theoretically–based indication of the effectiveness of fiber–optic technology for generating the types of interaction considered typical of single–site L2 classrooms. Analyses of the questionnaire data provide student perceptions of the observed instructional environment in support of interpretations of the evidence from discourse analysis.

Methodology

Participants

The present study was conducted using two combined level three and four Russian classes taught on the fiber-optic network in the state of Iowa during the spring semester of the 1993–94 year for discourse analysis. The observed classes, each approximately 35 minutes in length, originated from a small urban high school with eleven students present, and linked to one rural, high school remote–site with a total of eight students present. Students at the origination–site were bussed to the fiber–optic facilities at the neighboring community college, a journey of some ten minutes, as they were not yet in possession of their own fiber–optic classroom. A female facilitator employed specifically for the task of moderating distance instruction was present at the remote–site. The teacher at the origination–site was male, with nine years of experience as a Russian instructor, including one year in distance education. On–line, videotaped data were derived from the origination–site, while at the remote–site data were captured by live, videotape filming. Both origination and remote sites were equipped with technology with originating capabilities (see Appendix, Figure 2 for illustration). All students studying Russian at levels one, two, and combined three/four at both participating sites (origination–site n = 21; remote–site n = 16) were administered post–instruction questionnaires.

Procedures

A post-instruction questionnaire containing Likert-scaled and open-ended questions and administered to all students studying Russian on the fiber-optic network at the two participating sites provided data in regard to student motivation, perceived learning, and involvement.

Given the linguistic focus to research questions two and three, a discourse framework, as opposed to an interaction analysis framework, was chosen to describe interaction. Interaction analysis methodology can best be viewed as focusing on contextual issues to classroom behavior with the verbal content forming part of the context. Discourse analysis, on the other hand, considers the structure of the verbal content with para- and non-linguistic information playing a supporting role. In light of this distinction, Sinclair and Coulthard's (1975) framework for discourse analysis, which offers a complete, functional-structural descriptive tool, forms the basis of the instrument designed for this study. The Sinclair and Coulthard model revolves around a hierarchy of analytical levels from the act, at the lowest level, to moves, exchanges, and transactions. Each rank is composed of units of the lower level. Transactions may be considered as analogous to distinct pedagogical stages within the lesson, while acts (a total of 22 in the original description) represent minimal units of functional significance.

Discourse data for the two classes selected for analysis were transcribed, translated, and then coded at the level of act by two trained raters. The coded data for the first class were measured against a criterion measure provided by the researcher (agreement figures for each of the two raters were p = 0.61 and 0.66), across coders for inter-rater agreement (p = 0.64), and within coders in a code-recode procedure (p = 0.62 and 0.69 for individual rater stability; p = 0.88 for a second criterion-related agreement assessment). These agreement figures would seem to indicate coding stability across raters, and therefore somewhat stable application of the instrument. The rather low initial criterion-related agreement figures may reflect the complex nature of the raw discourse data, rather than the ability of the raters to apply the instrument. Figures are likely to have been considerably higher if ambiguous, partially inaudible, or unsystematic discourse had been distinguished from task-related classroom discourse and eliminated from calculations. Sinclair and Coulthard (1975) are careful to point out that their framework for analysis was not designed to handle "pupil/pupil interaction in project work, discussion groups, or the playground" (p.6), indicating its lack of suitability for less systematic discourse (see Fast, 1995, for further discussion of the Sinclair & Coulthard model).

Results

Question One: What are some of the Contextual Features of Interaction in Multisite, Fiber-Optic L2 Instruction

Four questions were asked on the post-instruction questionnaire designed to obtain data on student motivation toward multisite instruction. The questions were:

1. Do you look forward to interactive TV classes?
2. Do you look forward to foreign language classes on the interactive TV system?

3. Do you like studying foreign languages?
4. Would you recommend interactive TV classes to a friend?

Results of T–test analyses across site for each of these questions indicated a significantly more favorable response on the part of remote–site students than origination–site students except for the question 'Do you like studying foreign languages?' ($p \leq .01$; $p \leq .002$; $p \leq .128$; $p \leq .011$, respectively). These results (see Figure 4, and Appendix, Table 1) suggest that origination–site students' clearly favorable impression of foreign language learning is offset by their apparent dislike for the multisite learning environment, but did not reveal whether their dislike concerned peripheral consequences of technology, the technology itself, or other factors. Remote–site students' more favorable attitude toward multisite instruction may reflect a recognition of the fact that without the system they would not receive Russian classes. Results of T-tests across levels at the remote–site[1] indicated that level one and two students responded significantly more favorably than level three/four students on all four questions ($p \leq .026$; $p \leq .000$; $p \leq .022$; $p \leq .003$, respectively). This may be due to differences in L2 learning history.

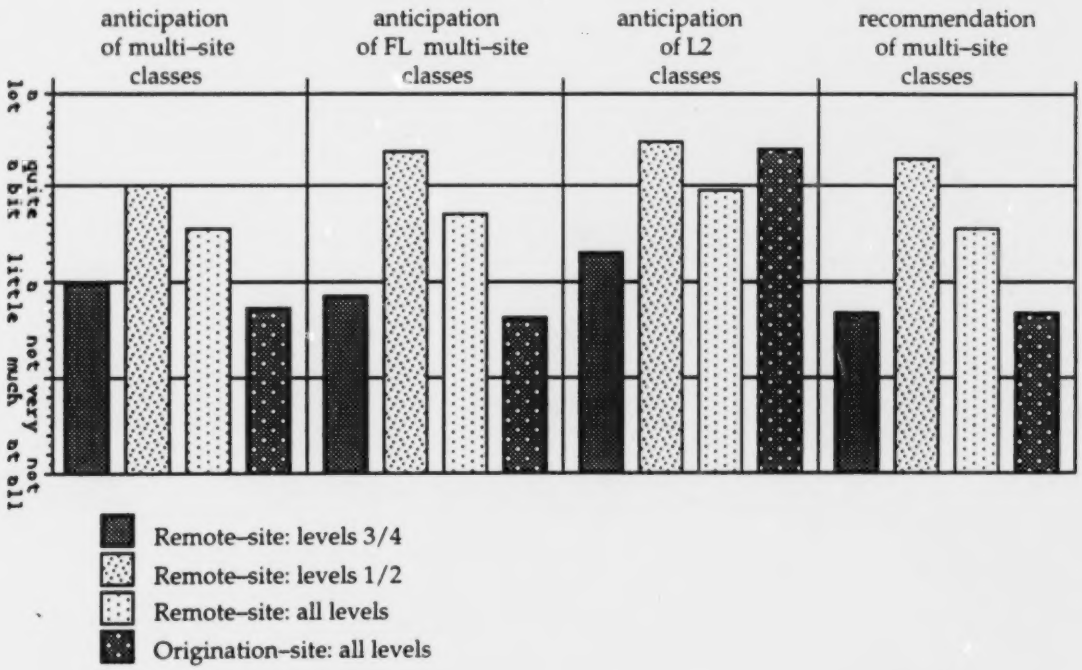

Figure 4. Student Motivation by Site and Level.

[1] For reasons beyond the control of the researcher distinctions between levels was not captured in the data for the origination–site.

Potential reasons for these significant differences across site and level may be clarified in part by students' responses to two open–ended questions included on the questionnaire:

5. Briefly explain what you like about interactive TV classes.
6. Briefly explain what you dislike about interactive TV classes.

Responses were grouped post–facto into six categories: technology, human interest, learning, class organization, interaction, and miscellaneous (see results in Appendix, Table 2).

Results of percentage calculations per category across sites and levels for question 5 suggest that students find multisite instruction a positive experience principally for two reasons: human interest, and facilitation of learning. Many students made reference to opportunities for meeting and communicating with different people. Typical of responses that express this desire are the following: 'It gets us a little further out of the classroom and further into the world' and 'I like the fact that it brings classes to places it normally wouldn't go'. Students also considered that multisite instruction had positive effects for learning. Remote–site students particularly highlighted the opportunity to take Russian afforded to them by the network. Origination–site students, to a lesser extent, also considered the network important for their continued involvement with Russian, perhaps implying that their course may have been eliminated if it had not been for the fiber–optic facility. A few students cited the positive effects of the technology, especially its audiovisual capabilities. These would appear to be strong recommendations for the interactive potential of the network.

With respect to dislikes of multisite instruction, two interesting tendencies are suggested. First, over 40% of all dislikes given by origination–site students concerned class organization (principally less class time, and bussing to the fiber–optic site). Typical of the comments were the following: 'I don't like these classes because right now it [bussing] cuts about 20 minutes out of our total class time'; and 'To be practical the classroom needs to be in our building - bussing to the college and back takes away half the class time, which seriously inhibits the amount you can learn in the class'. Class organization was not considered to be an issue among remote–site students (except that some upper–level students remarked on the negative effect of the change of teacher caused by multisite instruction). Technological facilities were not considered a serious problem by origination–site students, while remote–site students suggested that the audio technology was less than desirable. These results provide some clarification of the T–test results, confirming suggestions that origination–site students' criticisms of multisite instruction concerned the peripheral effects of the technological environment rather than the technology itself.

Secondly, almost 60% of remote–site students' criticisms (75% among upper–level students) focused on the interactive characteristics of multisite instruction. Their criticisms covered the following range of problems: 'the difficulty of interaction when everybody talks'; 'feeling that you are not really part of the class'; 'lack of one–on–one interaction or personal attention from the teacher'; 'reduced interaction time'; 'having the teacher located at a distance'; and, 'difficulty in interrupting class to pose questions'. Origination–site students also made some criticisms of the interactive qualities

of the system, especially in regard to the deficit of personal interaction with the teacher. Overall, these results would suggest that remote–site students tended to experience difficulty in being accepted as part of the discourse domain, while origination–site students found it more difficult to share their teacher with a remote-site.

Two questions were designed to assess student perceptions of learning in multisite, fiber–optic classes:

7. Does the interactive TV system allow you to learn effectively?
8. Can you learn as much on the interactive TV system as in your other classes?

With respect to the question on learning effectiveness in multisite classes, origination–site mean response was 'a little' on a five–point scale (5 = a lot; 4 = quite a bit; 3 = a little; 2 = not very much; 1 = not at all). Remote–site mean response was between 'a little' and 'quite a bit'. In response to question 8, both sites seemed to indicate that learning was not as effective in the multisite environment as for their normal learning environment. For both questions no significant difference emerged for learning as a function of site. However, when T-tests were conducted across level at the remote–site, significant differences were found in both cases ($p \leq .002$, and $p \leq .037$, respectively). These results (see Figure 5, below, and Table 3, Appendix) suggest that the lower–level remote–site students' favorable impression of multisite instruction is supported by their belief that they can learn at least as well as in the single–site environment. Remote–site upper level students together with the origination–site students (where no distinctions for levels was possible) would appear to maintain their greater skepticism.

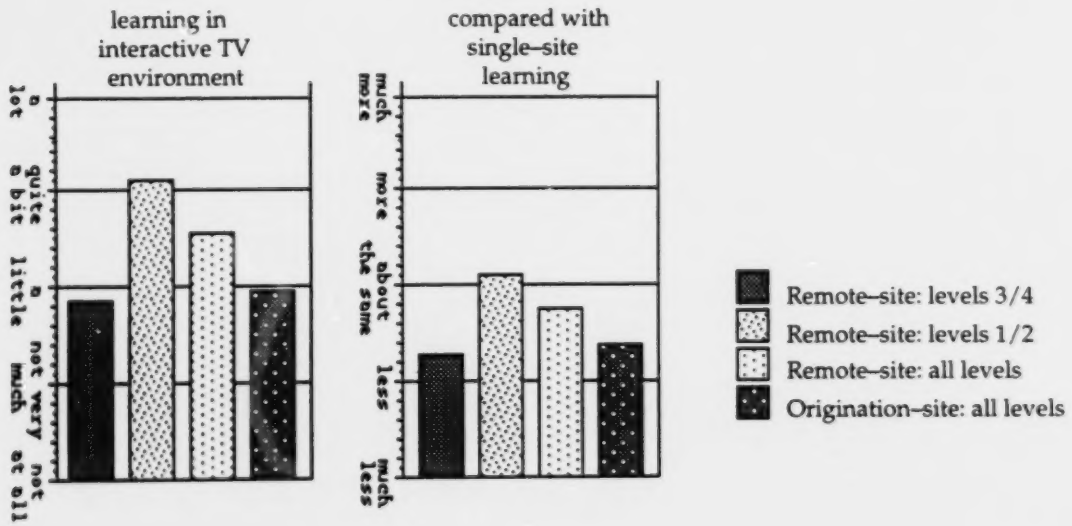

Figure 5. Student Perceptions of Learning by Site and Level.

9. Do you normally have opportunities to speak and work with students at the other site during classes on the interactive TV system?
10. Does having classes with the teacher in a different site hinder you from learning or receiving proper attention? (addressed to remote–site students only)
11. Do students in the other site have an equal share of class participation?

The first of these questions assessed student perceptions of their interaction with the other site. Mean responses across site and level were between 'not very much' and 'a little' (see Figure 6, and Table 4, Appendix). These results suggest that students at both sites perceive interaction with the other site as somewhat limited. The second question assessed remote–site student perceptions of their interaction with a 'distant' teacher. T–tests indicated that level one and two students responded significantly more positively than did level three/four students ($p \leq .038$). Thus, upper–level students at the remote–site felt the 'distant' teacher to be a greater hindrance to learning than did lower–level students. The third question examined students' perceptions of other site involvement in interaction. Both origination and remote sites perceived interaction to be approximately equally distributed across sites. No significant differences were found when T–test analyses were carried out in respect of levels at the remote–site.

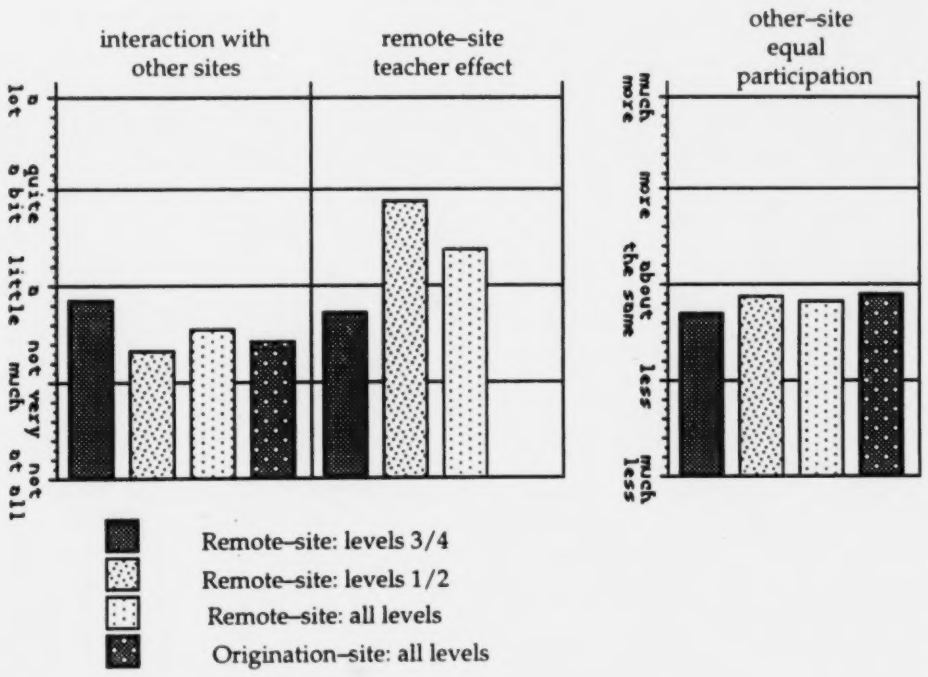

Figure 6. Student Perceptions of Involvement in Interaction by Site and Level.

Actual involvement in interaction was also measured by assessing the proportional distributions of acts across participants in the coded discourse data. Results of these analyses indicate that, from a discourse perspective, two somewhat distinct classes were observed. In the first, which concerned a teacher–centered approach to the practice of 'asking about and telling the time' in Russian, origination–site participation (including that of the teacher) exceeded remote–site participation by a ratio of approximately 4:1, with the teacher contributing approximately 64% of all acts. Student participation across sites was approximately equal. In the second observed class, in which a student at the remote–site was selected to lead the class, the ratio dropped to approximately 2:1 across sites. Teacher participation was inferior to that of student participation (43%:57%). Remote-site participation exceeded that of the origination–site by a ratio of 58%:42%. The remote–site student selected to lead the class accounted for 52% of the remote–site contribution of 58%. Use of the L2 was also measured in terms of acts across site and participant. Results show that for the first class teacher L2 use was 50%, while origination and remote–site L2 use was 13% and 14% respectively. In the second class results were 8%, 24%, and 38% respectively. L2 use by the remote-site student selected to lead the class was 66%.

Question Two: What Evidence is there for Teacher–Dominated Discourse

Characteristic of teacher–dominated discourse are Initiation–Response–Follow–Up (IRF) exchanges, Initiation–Response exchanges in which the teacher has refrained from judging the appropriateness of a student's response, sequences of Initiation exchanges in which the teacher provides information to the class in the absence of interaction, and Framing and Focusing moves which typically mark boundaries between the various stages of the class.

Many examples exist, predominantly in the class one data, of teacher–dominated IRF exchanges involving remote-site interaction. In the example in Table 5 the teacher nominates a student at the remote–site to respond to his Initiating move. He evaluates the student reply, and then initiates a new IRF exchange with the same student. These of course are characteristic move sequences in discourse controlled by the teacher. Asie's involvement in interaction with the teacher is dynamic, immediate, and accompanied by a video signal which the teacher is able to perceive on the rear monitor. The front monitor at the origination–site and all monitors at the remote–site display a video signal of the activity worksheet at this point in the discourse. Asie's reply to the teacher's check act ('Everything clear?') is not perceived through audio channels at the origination–site - Asie does not depress the microphone button. However, the video signal captures the student's non–verbal reply (a nod) which could be acted upon if necessary.

Table 5. Teacher-Centered IRF Discourse.

act #	sp	transcript	act	move
176	T	**Asie**	nom	
		I asked the question **Kagda...?** (When)	s	
		Am I asking what time it is right now, or am I asking what time an event takes place?	el	I
179	RSs	What time something takes place	r	R
180	T	OK (↘)	ev	F
		so what are you gonna look for on your answer, to make sure you get the right answer of these two?	el	I
182	RSs	**-ve-**	r	R
183	T	**-ve-** plus accusative	ac	F
		OK (↘)	ev	
		Everything clear? **Everything clear?**	ch	I
186	RSs	[Da] (nods)	r	R

On occasions reply moves are prefaced with sub–text between remote–site students, as shown in Discourse Segment Two (Table 6). Remote–site sub–text is not intended as inter–site interaction and is therefore not perceived through audio channels by the origination–site (designated in the transcript by

Table 6. Remote–Site Sub-Text in Teacher–Centered Discourse.

act #	sp	transcript	act	move
303	T	**Matvie...**	nom	
304	RSs	[Why's he picking on me]	as	
305	T	**Number 9, tell me please.**	s	
		What day is it?	el	I
		Tell me please. What day is it?		
307	RSs	[inaudible] (How do you start that one?)(?)	el	I
308	RSs	[Don't you just repeat it?]	r	R
309	RSs	Do er...	s	
		how do I start that one?	el	I
311	T	**Just Today...**	r	R
312	RSs	**Today is Tuesday**	r	R
313	T	**Today is Tuesday. Today is Tuesday**	ac	F
		Very good	ev	
		Ah	m	
		number 10	s	
		Kostia	nom	
		10	s	
		When are you going to Moscow?	el	I
		When are you going to Moscow?		
320	OSs	**You are going on Sunday**	r	R
321	T	OK (↗)	ac	F

Notes to Tables 5 and 6: underlined and bold text is either in the original Russian or has been translated from the original Russian; square brackets indicate audio signal not perceived by the other site; sp = speaker; T = teacher; RSs = remote–site student; OSs = origination–site student; nom = nominate; m = marker; s = starter; el = elicit; r = reply; ev = evaluate; ac = accept; as = aside; ch = check; I = Initiate; R = Response; F = Follow–up; ↗ = fall–rise intonation pattern; ↘ = fall intonation pattern.

square brackets). There are two segments of remote-site sub–text illustrated in Table 6: an aside act which falls outside the ongoing discourse ('Why's he picking on me?'), and an IR exchange sequence in which the remote–site student requests help from his neighbor before responding to the teacher (lines 307-308 of the transcript). When no help is forthcoming the student initiates an IR exchange with the teacher to clarify the problem ('Do er...how do I start that one?'/'**Just Today**'). The remaining RF moves to complete the teacher IRF exchange then follow. The discourse continues with an IRF exchange with an origination–site student. It should be noted that although remote–site sub–text is generally not perceived through audio channels at the origination–site, it is nevertheless perceived as a video signal by the teacher. Non–verbal clues are present in the video signal that may indicate to the teacher the existence of interaction which is not being shared with the whole class, and thus may be reacted upon as necessary. Remote–site sub–text would not appear to be fundamentally different from sub–group text in the single-site environment.

A further example of a teacher–dominated IRF exchange illustrates how such an exchange may consist of complex inter–site discourse (see Table 7). The teacher's Initiating move, which is amplified

Table 7. Complex Cross-Site Interaction in Teacher–Centered Discourse.

act #	sp	transcript	act	move
338	T	**Grisha...**	nom	
339	RSs	[Who's Grisha?]	el	I
340	RSs	[A name]	r	R
341	RSs	[Who is it?]	el	I
342	RSs	[I dunno. The one over there that we can't see]	r	R
343	T	**Marshalltownia**	nom	
		What time is it? What time is it?	el	I
		Use a whole number	cl	
346	OSs	[A whole number?]	el	I
347	T	**Da**	r	R
		What time is it now?	el	I
349	OSs	**It's...ahm...**	r	R
350	T	**How do you say** 'eleven' **in Russian?**	s	
		Asie	nom	
		How do you say 'eleven' **in Russian?**	el	I
353	RSs	**Eleven**	r	R
354	T	**Eleven**	ev	F
		Grisha...	nom	
356	OSs	**Now it's eleven o'clock**	r	R
357	T	**Da**	ac	F
		Now it's eleven o'clock	ev	

Notes: underlined and bold text is either in the original Russian or has been translated from the original Russian; square brackets indicate audio signal not perceived by the other site; sp = speaker; T = teacher; RSs = remote–site student; OSs = origination–site student; nom = nominate; m = marker; s = starter; el = elicit; r = reply; ev = evaluate; ac = accept; cl = clue; I = Initiate; R = Response; F = Follow–up.

by a clue as to how to respond, is prefaced with remote–site sub–text (a comment on the teacher's nominating act). The origination–site student questions the nature of the clue with an IR exchange with the teacher ('A whole number?'/'**Da**'). He is still unable to provide a Response move, and the teacher predicts his dilemma and a solution to it through an IRF exchange with the remote–site (lines 348-354). The teacher's original Initiating move (line 344) is then completed with the remaining RF moves (lines 356-357). This illustrates how acceptable teacher–dominated complex IRF discourse would appear to be perfectly feasible across sites.

Initiation–Response exchanges (exchanges where feedback has been withheld) are also characteristic of teacher–dominated discourse. Many examples are to be found in the class one data. Some examples illustrate teaching uses of the IR exchange, other examples indicate how they are used for classroom management. Table 8 provides illustrations of both types of IR exchanges. The first (lines 194-196 of the transcript) concerns an Initiation move from the teacher in which he elicits a written response from students at both sites. He is able to monitor remote–site students' non–verbal behavior through the video signal on the rear monitor. The second example involves a facilitator response to the

Table 8. Teacher–Centered IR Exchanges.

act #	sp	transcript	act	move
194	T	**Number 3**	s	
		When do your children arrive home? When do your children arrive home?	el	I
196	Ss	NV (students write reply)	r	R
5	T	**OK** (↘)	m	FR
		Today I'm...	s	
		Today I'm going to work with Herald	ms	FO
		OK (↗)	ch	I
9	F	[Ah!] (F indicates to students to change seats)	ack	R
10	T	**Herald will be working today**	ms	FO
44	T	Please copy this down very quickly while we wait for Marshalltown people to come	d	I
		Is it big enough for you to see	ch	I
		Spirit Lake?	nom	
47	RSs	No	r	R
70	T	**Matvie**	nom	
		I think you need glasses. You're really squinting	ch	I
72	S	I do have glasses	r	R
		I just don't like them	com	

Notes: underlined and bold text is either in the original Russian or has been translated from the original Russian; square brackets indicate audio signal not perceived by the other site; sp = speaker; T = teacher; F = facilitator; RSs = remote–site student; OSs = origination–site student; Ss = students from both sites; nom = nominate; m = marker; s = starter; el = elicit; r = reply; ack = acknowledge; com = comment; d = directive; ms = metastatement; I = Initiate; R = Response; FR = Frame; FO = Focus; ↘ = fall intonation pattern; ↗ = fall–rise intonation pattern.

teacher's check act (line 8). The check ('OK?') is a deliberate strategy on the part of the teacher to engage students in interaction in order to ascertain whether his prior non-interactive instruction ('**Today I'm going to work with Herald**'), expressed in Russian, has been understood. The facilitator acknowledges that she has understood the instruction with an interjection ('Ah!') and a non-verbal gesture to students at the remote-site to arrange themselves in the classroom according to levels. Her verbal response to the check is not perceived through audio channels at the origination-site. The teacher is, however, able to monitor the remote-site's response to his instructions through complex non-verbal video information.

The third and fourth examples also illustrate non-teaching uses of the IR sequence. The third segment (lines 44-47) illustrates a teacher's check on the suitability of his class materials for the remote-site. They respond with a succinct verbal reply. The fourth segment shows how the teacher is able to react to non-verbal video information perceived on the rear monitor. During a written task at the beginning of the class the teacher observes that one of the students in the remote-site is squinting as he copies down the material from the monitor. He inquires as to whether the student should not be wearing glasses for the task. The student's Response move provides a prompt reply to the teacher's check act.

Question Three: What Evidence is available for mutually constructed or negotiated meaning?

Mutually constructed or negotiated meaning in interaction involves students in a more equitable share of discourse construction. Features typical of mutually constructed interaction are the following:

1. student Initiating moves, including elicit, directive, informative, and loop acts;
2. a greater balance of student Initiating, Response , and Follow-up moves;
3. single Initiation exchanges or sequences of I exchanges;
4. student Framing (FR) moves which are metadiscoursal in nature and used to signal boundaries between transactions;
5. embellishment of main acts through the use of marker, starter, and comment acts.

Carefully constructed activities for socially relevant L2 interaction practice can be designed which exhibit features of this type.

The second observed class in the present study suggested more substantial involvement in interaction on the part of the students, both at the origination and remote sites. This was evident from calculations of act distributions across participants of the discourse data. The class was led by a remote-site student who adopted the role of the teacher by asking other students questions in Russian about a previously assigned text. Questions typically revolved around requests for reading, translating, demonstration of understanding of key phrases, ideas, and the structure of the text. Such an activity is, of course, likely to engender discourse that is characteristic only of the classroom, that is discourse

typified by three–phase exchanges composed of Initiation, Response, and Follow–up moves. Some communication skills facilitated in this type of activity may be transferable to other discourse domains.

Analysis of the discourse data for class two revealed many examples of cross–site student initiated and managed interaction, much of it in imitation of 'teacher–student talk'. Some examples are presented in Table 9.

In example 1 (lines 85-90 of the transcript), the remote–site student–teacher (B) nominates an origination–site student to read a section of the text in Russian. She appends an audio clue to her Initiating move ('...um this thing right here'), which is accompanied by a video–based clue (she points to the text). The origination–site student does not perceive the visual contextualization and asks for a clarification, which B provides by circling the relevant piece of text. The origination–site student is then able to react (line 90) to the directive, completing the IR exchange. Example 1 thus highlights

Table 9. Discourse Segments Illustrating Mutually Constructed Interaction.

act #	sp	transcript	act	move
85	B	Genia	nom	
		Read this phrase..."Mum one..."	d	I
		...um this thing right here. (points to relevant section of text displayed on TV monitor)	cl	
88	OSs	Can you point that out again please?	loop	I
89	B	NV (B circles text)	r	R
90	OSs	"What are you balling about? What's wrong? Then I began to cry and I said that I will not cough."	re	R
94	B	"Mum says why are you afraid to cough. You're even crying. I said I wanna go far far away. And then Mum said why is..."	s	
		Styopa. Styopa...	nom	
		Why...	s	
		Oh wait, sorry, I screwed up...	as	
		Why are you afraid to cough? (B intended to say: Why is he afraid to cough?)	el	I
99	OSs	Ha?	loop	I
100	B	Why was he afraid to cough?	el	I
101	OSs	I don't know	r	R
102	B	Matvie	nom	
		Why was he afraid to cough?	el	I
104	RSs	Because he wanted to go far far away	r	R
105	B	Right, good	ev	F

Table 9 continued.

act #	sp	transcript	act	move
148	B	**Grisha**	nom	
		Read this sentence. (B points to sentence)	d	I
		...just wait...just wait	as	
		Repeat	loop	I
152	OSs	**Why I said**	re	R
153	B	**Good**	ev	F
154	OSs	Do you want me to translate it too?	el	I
155	B	**Da**	r/el	R/I
156	OSs	Why I asked...	r	R
157	B	Good job	ev	F

Notes: underlined and bold text is either in the original Russian or has been translated from the original Russian; square brackets indicate audio signal not perceived by the other site; sp = speaker; RSs = remote–site student; OSs = origination–site student; B = remote–site student selected to lead class; nom = nominate; s = starter; el = elicit; r = reply; re = react; d = directive; cl = clue; as = aside; ev = evaluate; I = Initiate; R = Response; F = Follow–up; ↘ = fall intonation pattern; ↗ = fall–rise intonation pattern.

the importance of visual clues in creating the conditions for cross–site mutual construction of discourse. What makes this example an imitation of teacher–dominated discourse (and therefore less interesting from the L2 acquisition perspective) is not only the nature of the task required by B (reading from a text in Russian) but also its discourse structure (an exchange composed of a nominate–directive–react sequence of acts). However, much of the interaction has been achieved in Russian, across sites, and has exposed students to the need to control communicative strategies for negotiating and managing discourse (e.g., loops and clues) even though at this stage their ability to perform those strategies in Russian is still lacking.

Example 2 illustrates how negotiation of meaning in the L2 can easily lead to potential breakdowns in communication. However, solutions can be negotiated in L1 and L2 across sites in a reasonably effective manner, and breakdowns consequently avoided. B uses a section of the text to contextualize a question to the origination–site. She reads from the text and then nominates Styopa in the origination–site to respond to her question. Realizing that she cannot remember how to phrase her question in Russian, she creates time for herself with an aside (line 97) and then formulates a badly constructed question. The origination–site student fails to decode the question and resorts to English to request a repeat (line 99). B then correctly formulates the question in English, to which the origination–site student replies in Russian, indicating that he does not know the answer. B fields the question to a remote-site student, and we then observe a standard classroom IRF exchange sequence. The origination-site student's reply (line 101) indicated that he did not know the answer to the question posed to him, but importantly was expressed in Russian (incorrectly as the teacher usefully pointed out at the end of the class) and enabled the discourse to be continued. Clearly students reveal a need for the

expression of communicative devices such as the loop (line 99) and the negative reply (line 101) in Russian.

Example 3 illustrates cross-site negotiation in interaction achieved through student Initiating moves. These may be considered somewhat less typical in teacher-centered discourse. In this example B nominates an origination-site student to read a section of the text. Having reacted to this request (line 152) the origination-site student then feels that his contribution has been rather meager and initiates a new exchange (lines 154-157). Unfortunately, again the student resorts to English to realize the act (line 154) although would have been quite capable of expressing this initiating move in Russian.

Further examples of task-related, student managed and negotiated discourse occur in the data for this class, as do examples of cross-site negotiation involving teacher contributions to the discourse (see Fast, 1995).

As results of analyses on the discourse data for proportional distribution of acts revealed, the effects of a less teacher-centered approach to classroom interaction are to increase student involvement in discourse and student L2 use. These are major achievements in themselves for L2 acquisition although do not, of course, guarantee that adequate patterns of discourse are being acquired. This is illustrated with the data from this class which reveals that students imitate the discourse patterns they are familiar with from teacher-centered instruction, a strategy they adopt imposed upon them essentially by the nature of the task created by the teacher. More importantly the discourse data for class two illustrate how it is possible to create acceptable conditions for cross-site student-managed interaction to take place without breakdowns in communication occurring.

Conclusions

The present study has suggested a methodology for the analysis and description of multisite foreign or second language instruction, using discourse data obtained from the teaching of high school Russian on the fiber-optic network in the state of Iowa. The study has attempted to argue that classroom discourse may range from teacher-centered interaction to discourse in which students play a more equitable share in constructing and managing the discourse. It maintains that the latter form of interaction is more likely to provide acceptable conditions for l2 acquisition because it increases student output, student use of L2, and opportunities for the practice of a greater range of discourse acts, acts which are not practiced in teacher-centered interaction, and are more typical of non-classroom discourse.

The instrument used for discourse analysis, based on the Sinclair and Coulthard (1975) model, was able to describe a considerable portion of the data, although examples of degenerate data, off-task data, or acts not covered by the framework were encountered (see Fast, 1995 for discussion). Criterion and inter-rater agreement figures, as well as intra-rater stability figures obtained in this study suggested that the instrument could be adequately used to capture distinctions in the verbal and non-verbal behavior of participants in multisite, classroom-based interaction. Evidence was found in the data for the two observed classes of discourse patterns typical of teacher-centered instruction, and also

of mutually constructed or managed interaction. Both types of discourse involved effective cross–site interaction, as measured by theory–defined discourse patterns. As already argued, however, such discourse may not have been as effective for L2 acquisition.

Analyses of questionnaire data obtained from students at both participating sites indicated that many of the peripheral problems arising from fiber–optic networked instruction in its first year of use were perceived as an obstacle to motivation and learning. Such problems were: bussing students at the origination–site to the local community college for fiber–optic classes; reduced classroom contact time resulting from bussing and incompatible timetables across sites; and compounded levels within the same class. Students at both sites also indicated that opportunities for interaction were not always optimum, although both sites indicated that they had an equitable share in involvement in interaction. Student perceptions of similar levels of participation in interaction at both sites were supported by results of analyses to assess actual involvement in interaction. Criticisms of the technology were not particularly voiced. This would tend to suggest that diminished opportunities for interaction were a product of methodology, or organization, rather than technology.

Further work in the area of discourse analysis in multisite instruction is required, especially in relation to technological facilities which purport to facilitate dynamic interaction such as the fiber–optic network in the state of Iowa. 'Interactivity' is frequently claimed of technology and technology–driven instructional materials without a theory–driven definition of what is understood by such a term. This study has suggested a methodology by which this may be achieved, although results suggest that the framework requires adaptation for the special conditions inherent in multisite and technology–mediated communication.

Much interest is reported in the educational literature at present on the ability of modern technologies to provide students in the classroom with links to the outside world. Research must be carried out to assess the validity of changes made in response to this considerable interest and to provide educators with informed suggestions as to how best to exploit the technologies that we have available.

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APPENDIX

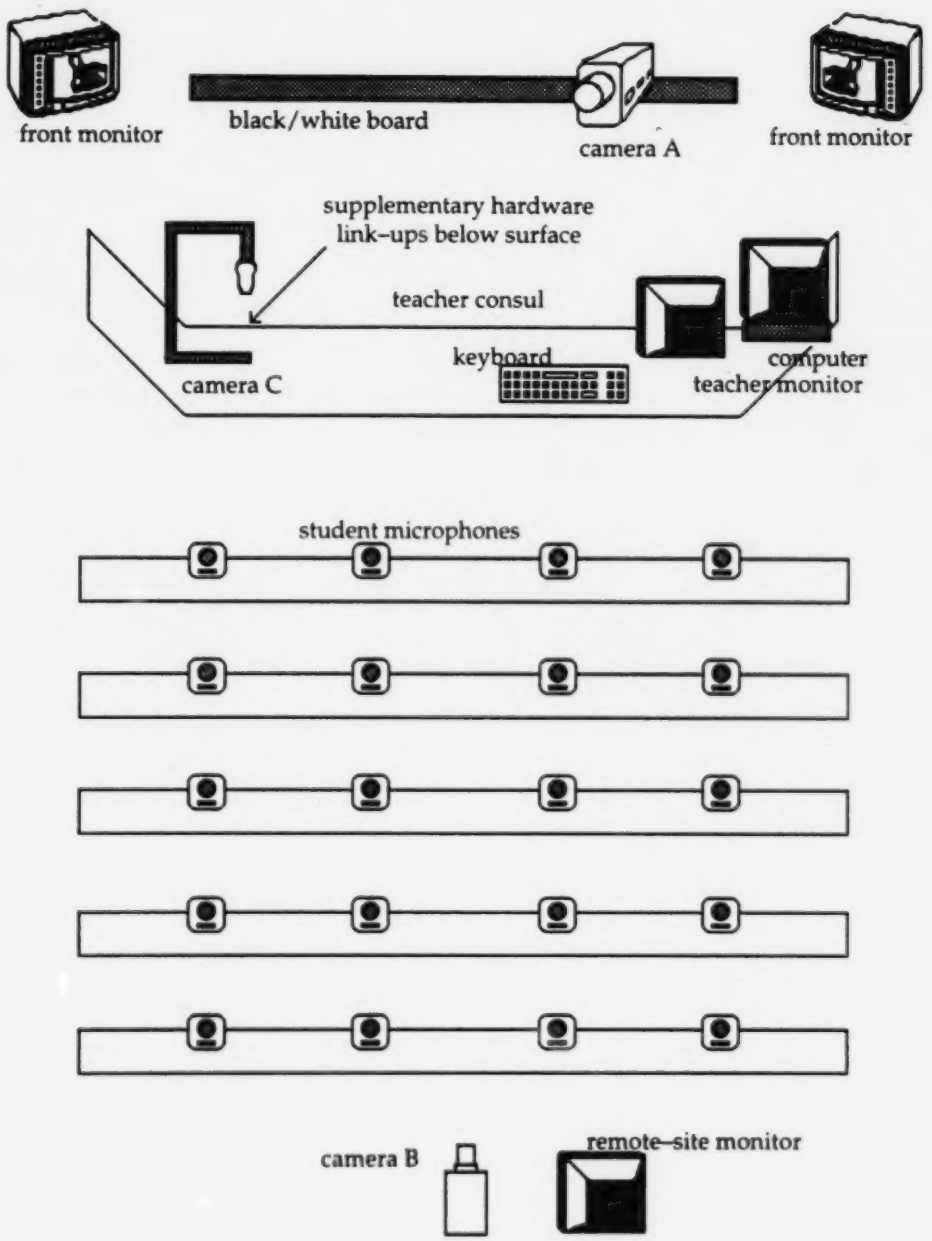

Figure 2. Diagram of typical fiber-optic classroom.

Table 1. Results of T-tests on Responses to Questions regarding Student Motivation by Site and Level.

Question	by Site				by R Level			
	site	Mean	SD	T-value (df=35)	level	Mean	SD	T-value (df=14)
Do you look forward to interactive TV classes?	R	3.56	0.96	-2.73**	1/2	4.00	1.00	-2.51*
	O	2.71	0.90		3/4	3.00	0.58	
Do you look forward to foreign language classes on the interactive TV system?	R	3.69	0.95	-3.36**	1/2	4.33	0.71	-5.36***
	O	2.62	0.97		3/4	2.86	0.38	
Do you like studying foreign languages?	R	3.94	1.00	1.58	1/2	4.44	0.73	-2.67*
	O	4.38	0.59		3/4	3.29	0.95	
Would you recommend interactive TV classes to a friend?	R	3.56	1.19	-2.69**	1/2	4.33	0.87	3.76***
	O	2.45	1.26		3/4	2.57	0.98	

Notes: R = remote–site; O = origination–site; response scale for questions: 5 = a lot; 1 = not at all
*p≤.05 =; **p≤.01; ***p≤.001

Table 2. Results of Student Like and Dislike of Multi–Site Instruction.

category	OS all levels	RS all levels	RS 3/4	RS 1/2
LIKES				
technology	11.1	4.5	14.3	0.0
human interest	48.1	40.9	28.6	46.7
learning	22.2	40.9	57.2	33.4
class organization	3.7	0.0	0.0	0.0
interaction	0.0	0.0	0.0	0.0
miscellaneous	14.8	13.6	0.0	20.1
DISLIKES				
technology	13.8	23.5	12.5	33.3
human interest	11.4	5.9	0.0	11.1
learning	9.2	0.0	0.0	0.0
class organization	41.0	11.8	12.5	11.1
interaction	22.8	58.5	75.0	44.4
miscellaneous	2.3	0.0	0.0	0.0

Notes: figures presented as percentages of total # reasons per level;
OS = origination–site; RS = remote–site

Table 3. Student Perceptions of Learning by Site and Level.

Question	by Site				by R Level			
	site	Mean	SD	T-value (df=35)	level	Mean	SD	T-value (df=14)
Does the interactive TV system allow you to learn effectively?	O	2.95	1.02	-2.02	1/2	4.11	0.33	4.42***
	R	3.56	0.81		3/4	2.86	0.69	
Can you learn as much on the interactive TV system as in your other classes?	O	2.38	0.74	-1.46	1/2	3.11	0.60	2.37**
	R	2.75	0.78		3/4	2.29	0.77	

Note: R = remote-site; O = origination-site; response scale for questions: 5 = a lot; 1 = not at all
**p≤.01; ***p≤.001

Table 4. Student Perceptions of Involvement in Interaction by Site and Level.

Question	by Site				by Level			
	site	Mean	SD	T-value (df=35)	level	Mean	SD	T-value (df=14)
Do you normally have opportunities to speak and work with students at the other sites during classes on the interactive TV system?	O	2.43	0.87	-0.48	1/2	2.33	0.71	-1.27
	R	2.56	0.81		3/4	2.86	0.90	
Does having classes with the teacher in a different site to you hinder you from learning or receiving proper attention?					1/2	3.89	0.78	2.37**
					3/4	2.71	1.11	
Do students in the other sites have an equal share of class participation?	O	2.90	0.54	0.42	1/2	2.89	0.60	0.42
	R	2.81	0.75		3/4	2.71	0.95	

Note: R = remote-site; O = origination-site; response scale for questions: 5 = a lot; 1 = not at all
*p≤.05; **p≤.01; ***p≤.001